

REMARKS

Claims 1-22 were examined.

Claim Amendments

For claims 7-8, the central surface average roughness "Sa" of the zirconia surface layer is defined to be from 10 to 40 $\mu$ m, the central line average surface roughness (Ra) is described to be from 10 to 40 $\mu$ m (page 2, paragraph 0005).

Note, that the central surface average roughness "Sa" and the central line average surface roughness (Ra) are significantly different from each other, and have no correlation.

The "Ra" value can be obtained by extracting standard lengths in the direction of its parallel lines from a roughness curve, summarizing the absolute values of the deviations from the average line to the measured curve in the extracted section, and averaging the same. The roughness is measured in only one direction (X'-direction) of the line segments. On the other hand, the "Sa" value can be obtained by measuring the roughness of two directions (X-direction and Y-direction) of a surface. Even if the "Ra" values of the X'-direction and the X-direction are the same, the "Sa" value increases when the Y-direction is rough while the "Sa" value decreases when the Y-direction is smooth. In this manner, if the "Ra" values would be the same, the "Sa" values are usually different, and there is no correlation between "Ra" and "Sa".

Claim 11 has been amended. Please refer to page 12, lines 20 to 25 of the English text for the intermediate layer, as well as the prior claims. Claim 11 recites the existence of the intermediate layer which is solid-phase calcined. In accordance with this configuration, the zirconia surface layer is hardly peeled-off, and the particle drop from the surface layer can be prevented.

Since the particles of the intermediate layer are solid-phase calcined, they are calcined while retaining the original shapes to provide the surface with a lot of apertures. The particles of the surface layer on the intermediate layer are melted during the calcination to proceed into the apertures. Then, the stacked layers are solidified as if the particles of the surface layer were forced into wedges of the intermediate layer. Accordingly, the surface layer is hardly separated from the intermediate layer, and the particle drop from the surface layer is effectively prevented.

Further:

Claims 1 to 6 were cancelled.

Claims 7-8 were amended in include prior claim 9.  
Claims 9-10 were cancelled.

Claim 11 includes prior claim 12.

Claim 12 was cancelled.

Claim 13 includes prior current claim 17.

Claim 14 includes prior claim 17.

Claims 15 to 22 were cancelled.

No new matter is entered by way of these amendments.

35 USC 112, 2<sup>nd</sup> Paragraph Rejection

Claims 7-8 and 10-14 were rejected as indefinite under 35 USC 112, second paragraph.

The Official Action indicates that the term central surface average roughness "Sa" is indefinite.

Applicants respectfully disagree and request the rejection be withdrawn. The term is defined on specification page 18, beginning with line 18:

Then, the central surface average roughness "Sa" of the third invention will be described.

The central surface average roughness "Sa" is a value obtained by totalizing absolute values of deviations from an average surface to a measured curve and averaging the obtained value, and is specified in the following formula.

$$Sa = \frac{1}{mn} \cdot \sum_{l=1}^n \sum_{k=1}^m |Y(x_k, y_l)|$$

In the formula, "m" designates the number of positions in the x-direction where the measuring is conducted, "n" designates the number of positions in the y-direction where the measuring is conducted, and "Y(xk, yl)" designates deviations from a "k"th measuring point in the x-direction and from an "l"th measuring point in the y-direction to an average surface. The degree of concavity and convexity of the surface can be judged in accordance with the value of the central surface average roughness. As the measuring apparatus, SV600-3D available from Kabushikigaisha Mitutoyo can be used.

Note that "Sa" is different from arithmetic average roughness "Ra". See page 19, beginning at line 12:

While the surface roughness can be evaluated by the arithmetic average roughness "Ra" specified in JISB0601-1994, it can be evaluated more precisely by using the central surface average roughness "Sa" because of the local surface irregularity in the jig for

calcining the electronic component of the present invention.

Thus, applicants respectfully request the rejection be withdrawn.

35 USC 102, 103 Rejections

Claims 1-2, 4-5, and 7-8 were rejected as anticipated by, or in the alternative, as obvious over, YASUDA et al. 5,955,182 "YASUDA".

Claims 1-9 and 18-20 were rejected as obvious over Takahashi NORIYUKI et al. JP 2002-128583 "NORIYUKI".

Claims 1, 2, 4, and 5 were rejected as obvious over Toshiya KISHIMOTO JP 2002-060277 "KISHIMOTO".

Claims 1-16 and 18-20 were rejected as obvious over NORIYUKI in view of YASUDA.

Claims 12, 17, and 20-21 were rejected as obvious over NORIYUKI in view of YASUDA and further in view of TAKEUCHI et al. 2002/0041131 "TAKEUCHI".

Response

The amended claims are neither anticipated nor rendered obvious by any of the references, or combinations of the references.

In claims 7-8, the central surface average roughness "Sa" of the zirconia surface layer is defined to be from 10 to

40 $\mu$ m, the central line average surface roughness (Ra) is described to be from 10 to 40 $\mu$ m (page 2, paragraph 0005).

The Official Action states that the prior art teaches "... having an arithmetic average roughness "Ra" from 10 to 40 microns" in NORIYUKI; the actual description is "... having a central line average surface roughness "Ra" from 10 to 40 microns").

As noted above, the central surface average roughness "Sa" and the central line average surface roughness (Ra) are significantly different from each other, and have no correlation.

The "Ra" value can be obtained by extracting standard lengths in the direction of its parallel lines from a roughness curve, summarizing the absolute values of the deviations from the average line to the measured curve in the extracted section, and averaging the same. The roughness is measured in only one direction (X'-direction) of the line segments.

In contrast, the "Sa" value can be obtained by measuring the roughness of two directions (X-direction and Y-direction) of a surface. Even if the "Ra" values of the X'-direction and the X-direction are the same, the "Sa" value increases when the Y-direction is rough while the "Sa" value decreases when the Y-direction is smooth. In this manner, if the "Ra" values would be the same, the "Sa" values are usually different, and there is no correlation between "Ra" and "Sa".

Thus, although NORIYUKI describes that the central line average surface roughness (Ra) is from 10 to 40 $\mu$ m, even a skilled technician cannot easily conceive that the central surface average roughness "Sa" of the zirconia surface layer is from 10 to 40 $\mu$ m in the inventions of claims 7 and 8.

Therefore, these claims are patentable.

Claim 11 recites the existence of the intermediate layer which is solid-phase calcined. In accordance with this configuration, the zirconia surface layer is hardly peeled-off, and the particle drop from the surface layer can be prevented.

These effects seem to be realized in accordance with the following reasons. Since the particles of the intermediate layer are solid-phase calcined, they are calcined while retaining the original shapes to provide the surface with a lot of apertures. The particles of the surface layer on the intermediate layer are melted during the calcination to proceed into the apertures. Then, the stacked layers are solidified as if the particles of the surface layer were forced into wedges of the intermediate layer. Accordingly, the surface layer is hardly separated from the intermediate layer, and the particle drop from the surface layer is effectively prevented.

An intermediate layer having the recited features of claim 11 is not found in the applied art.

Therefore this claim is also not anticipated or rendered obvious.

Claims 13-14 include the features of prior claim 17.

Claim 17 was rejected over NORIYUKI in view of YASUDA and further in view of TAKEUCHI. These references have been carefully reviewed and are not found to teach or suggest the feature of metal oxides used as a sintering aid for calcining the zirconia layer coated on the substrate surface, alumina intermediate layer coated on the substrate surface, and the zirconia layer coated on the alumina intermediate layer.

Therefore, claims 13-14 are also non-obvious.

Reconsideration and allowance of all the claims are respectfully requested.

This response is believed to be fully responsive and to put the case in condition for allowance. An early and favorable action on the merits is earnestly requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.



The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Roland E. Long, Jr./

Roland E. Long, Jr., Reg. No. 41,949  
209 Madison Street  
Suite 500  
Alexandria, VA 22314  
Telephone (703) 521-2297  
Telefax (703) 685-0573  
(703) 979-4709

REL/lrs